

SECTION 914—ROADSIDE DEVELOPMENT MATERIALS

914.01 Special Topsoil for Roadside Development. This topsoil shall consist of loose friable soil, free of refuse, stumps, large roots, rocks over 50 mm (2 in.) in diameter, brush, weeds, or other material which would be detrimental to the proper development of vegetative growth. It shall be capable of supporting normal vegetation as demonstrated by the growth of healthy vegetation on it. It shall not be taken from a source known to contain any of the noxious weeds defined as such in the Indiana State Seed Law, IC 15-4-1.

- 10 Topsoil shall have a pH value of 6.2 to 7.4. Testing for pH value shall be performed in the field in accordance with the procedure set out in the Purdue University Agricultural Experiment Station bulletin No. 635 or in a qualified laboratory in accordance with the procedure set out in the Cornell Experiment Station Bulletin 960, using a one to one Soil-Water Suspension. Agricultural limestone may be added to topsoil in order to raise the pH to meet specification requirements. Topsoil shall not be incorporated into the work until it is approved.

914.02 Blank.

- 20 **914.03 Fertilizer.** Fertilizer shall be standard commercial fertilizer with an analysis of 12-12-12.

Tests will not be required, but fertilizer standards shall be governed by the rulings of the Indiana State Seed Commissioner.

914.04 Grass and Legume Seed. Grass and Legume seed in the quantities and varieties required shall be furnished full-tagged and delivered in properly designated packages or bags as directed. Seeds shall be in accordance with the following requirements.

- 30 Seed of warm season grasses, forbs, or aquatic species shall be delivered to the project site individually packaged by species. Warm season grass and forb seed shall be purchased from lots for which test results are provided. Testing will not be required for aquatic species. When normal germination testing is not practical for forb species, a tetrazolium test shall be conducted to determine seed viability.

Seeds shall contain none of the noxious weeds listed herein nor any that are listed in the Acts of the General Assembly of the State. Noxious weeds are Canada Thistle, Field Bindweed, Johnson Grass, Perennial Peppergrass, Perennial Sowthistle, Quack Grass, Russian Knapweed, and Wild Garlic.

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Clover shall be free from dodder with no tolerance allowed. Lespedeza will be allowed no more than 200 dodder/kg (90 dodder/lb) and 20 giant foxtail per kg (45 giant foxtail per lb).

Requirements noted above are minimum and trade allowances will not be permitted.

Seed shall be purchased from sources of supply that have been sampled, tested, and reported by the State Seed Commissioner, Purdue University, West Lafayette, Indiana, and

found to be satisfactory. Seed of warm season grasses shall be tested by the State Seed Commissioner or an independent laboratory. Seed of forbs shall be tested by an independent laboratory. Test results by independent laboratories shall be signed by a Registered Seed Technologist. Test results shall be submitted to the State Seed Commissioner, and a copy to the Division of Materials and Tests. This report is required before seed is sown. Such test report shall be no more than 9 months old at the time seed is used and the use of the seed shall be subject to approval.

60 Seed which has been tested by the State Seed Commissioner may be used without further testing provided each bag of seed bears a tag showing the seed meets the requirements of the Standard Specifications.

Seed which meets the weed seed tolerance, but does not comply with the purity or germination requirements, or both, may be used provided the percentage of purity or the percentage of germination is not more than 10 percent below the minimum specified and that the result obtained from the following formulae does not exceed the maximum percent of weed seeds permitted.

$$W \times P \times G = M \text{ or less}$$

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$$P = \frac{\text{Minimum Specified Purity}}{\text{Actual Purity}}$$

$$G = \frac{\text{Minimum Specified Germination}}{\text{Actual Germination}}$$

W = Actual percent of weed seeds

P = Purity Factor

G = Germination Factor

80

M = Maximum percent of weed seeds permitted

If such seeds are selected for use, the amount to be used shall be increased in accordance with the following formula except the amount used shall not be less than that specified.

$$\text{Amount to be used} = \text{Amount specified} \times P \times G$$

90

100

110

VARIETY		Percentages of Weed Seed Content (Not more than)
Alfalfa	Medicago sativa	0.5
Alsike Clover	Trifolium hybridum	0.5
Alta Fescue or Ky. 31	Festuca elatior	
Fescue	(var. arundinacea)	0.75
Birdsfoot Trefoil	Lotus corniculatus	0.5
Chewings Fescue	Festuca rubra (var. fallax) ...	0.5
Crown Vetch (Penngift, Emerald, Chemung)	Coronilla	0.5
English Perennial Rye	Lolium perenne	0.5
Kentucky Bluegrass	Poa prateusis	0.5
Korean Lespedeza	Lespedeza stipulacea	0.75
Sericea Lespedeza	Lespedeza sericea	0.75
Ladino Clover	Trifolium repens (var. latum)	0.5
Lemons Alkali Grass	Puccinellia airoides (Lemons)	0.5
Orchard Grass	Dactylis glomerata	0.5
Red Clover	Trifolium pratense	0.5
Red Fescue	Festuca rubra	0.5
Red Top	Agrostis alba	0.75
Rough Stalked Meadowgrass	Poa trivialis	0.5
Rye, Agricultural	Secale cereale	0.5
Rye, Annual	Lolium multiflorum	0.5
Sheeps Fescue	Festuca orina	0.5
Smooth Brome Grass	Bromus inermis	0.95
Sweet Clover-white (Scarified)		
Sweet Clover-yellow (Scarified)	Melilotus alba	0.5
Timothy	Melilotus officinalis	0.5
White Clover	Phleum pratense	0.5
	Trifolium repens	0.75

VARIETY		Percentages of Purity (Not less than)
120	Alfalfa	Medicago sativa 99
	Alsike Clover	Trifolium hybridum 97
	Alta Fescue or Ky. 31	Festuca elatior
	Fescue	(var. arundinacea) 98
	Birdsfoot Trefoil	Lotus corniculatus 98
	Chewings Fescue	Festuca rubra (var. fallax) 97
	Crown Vetch (Penngift, Emerald, Chemung)	Coronilla 95
	English Perennial Rye	Lolium perenne 95
	Kentucky Bluegrass	Poa pratensis 85
	Korean Lespedeza	Lespedeza stipulacea 98
130	Sericea Lespedez	Lespedeza sericea 98
	Ladino Clover	Trifolium repens (var. latum) 98
	Lemons Alkali Grass	Puccinellia airoides (Lemons) 85
	Orchard Grass	Dactylis glomerata 85
	Red Clover	Trifolium pratense 98
	Red Fescue	Festuca rubra 95
	Red Top	Agrostis alba 90
	Rough Stalked Meadowgrass	Poa trivialis 85
	Rye, Agricultural	Secale cereale 99
	Rye, Annual	Lolium multiflorum 95
140	Sheeps Fescue	Festuca orina 97
	Smooth Brome Grass	Bromus inermis 85
	Sweet Clover-white (Scarified)	Melilotus alba 98
	Sweet Clover-yellow (Scarified)	
	Melilotus officinalis 98
	Timothy	Phleum pratense 90
	White Clover	Trifolium repens 97

150

VARIETY		Percentages Actual Germination (Not less than)
Alfalfa	Medicago sativa	85*
Alsike Clover	Trifolium hybridum	85*
Alta Fescue or Ky. 31	Festuca elatior	
Fescue	(var. arundinacea)	85
Birdsfoot Trefoil	Lotus corniculatus	80*
Chewings Fescue	Festuca rubra (var. fallax)	75
Crown Vetch (Penngift, Emerald, Chemung)	Coronilla	70*
English Perennial Rye	Lolium perenne	90
Kentucky Bluegrass	Poa prateusis	80
Korean Lespedeza	Lespedeza stipulacea	80*
Sericea Lespedeza	Lespedeza sericea	80*
Ladino Clover	Trifolium repens (var. latum)	85*
Lemons Alkali Grass	Puccinellia airoides (Lemons)	80
Orchard Grass	Dactylis glomerata	80
Red Clover	Trifolium pratense	90*
Red Fescue	Festuca rubra	85
Red Top	Agrostis alba	80
Rough Stalked Meadowgrass	Poa trivialis	75
Rye, Agricultural	Secale cereale	80
Rye, Annual	Lolium multiflorum	90
Sheeps Fescue	Festuca orina	75
Smooth Brome Grass	Bromus inermis	80
Sweet Clover-white (Scarified)	Melilotus alba	85*
Sweet Clover-yellow (Scarified)	Melilotus officinalis	85*
Timothy	Phleum pratense	85
White Clover	Trifolium repens	90*

*including not more than 25% hard seeds

914.05 Mulch.

(a) **Mulch for Seeding.** Mulch for seeding may consist of straw; chaff; clover, timothy, alfalfa, peppermint, or soy bean hay; shredded fodder; excelsior mulch; wood cellulose fiber mulch; or clover chaff. All mulch shall be reasonably free from primary noxious weeds in accordance with 914.04.

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Excelsior mulch shall consist of wood fibers cut from sound green timber. The average length of the fibers shall be 100 to 150 mm (4 to 6 in.). The cut shall be made

in such a manner as to provide maximum strength of fiber, but at a slight angle to the natural grain of the wood so as to cause splintering of the fibers when weathering in order to provide adherence to each other and to the soil.

170 Wood cellulose fiber mulch shall be made from wood chip particles manufactured
articularly for discharging uniformly on the ground surface when disbursed by a hydraulic
water sprayer. It shall remain in uniform suspension in water under agitation and blend with
grass seed, and fertilizer when permitted, to form a homogeneous slurry. The mulch fibers
shall intertwine physically to form a strong moisture holding mat on the ground surface. The
mulch shall be heat processed so as to contain no germination or growth inhibiting factors.
It shall be non-toxic and colored green. The percent of moisture content shall be determined
in accordance with 621.12(b), except material containing more than 15 percent will be
rejected. The ash content shall not exceed 1.5 percent. One hundred grams of oven dried
180 material saturated in water, drained, and weighed shall hold a minimum of 1000 grams of
water. Material furnished under this specification shall be covered by a type C certification
in accordance with 916.

(b) **Mulch for Plants.** Mulch for plants shall consist of broken corncobs, wood
chips, chopped bark, size No. 5 gravel or crushed stone in accordance with 904.02(e), except
0 to 5 percent may pass the 75 μ m (200) sieve, or other approved materials. The particles of
wood chips, chopped bark, and corncobs shall contain no more than 10 percent passing the
12.5 mm (1/2 in.) screen and 100 percent shall pass the 75 mm (3 in.) screen. Wood chips
shall be from green, hardened, deciduous trees. Broken corncobs shall be no longer than 100
mm (4 in.).

190 (c) **Excelsior Blanket.** Excelsior blanket shall consist of a machine produced mat
of wood excelsior with 80 percent of the fibers to be 150 mm (6 in.) or longer. The wood
from which the excelsior is cut shall be properly cured to achieve adequately curled and
barbed fibers. The blanket shall be of consistent thickness, with the fiber evenly distributed
over the entire area of the blanket. The excelsior blanket shall be covered on the top side with
a 75 mm by 25 mm (3 in. by 1 in.) leno weave, twisted kraft paper yarn netting having a high
wet strength, or a biodegradable extruded plastic mesh netting having an approximate
minimum opening of 16 mm (5/8 in.) by 16 mm (5/8 in.) to an approximate maximum opening
200 of 50 mm (2 in.) by 25 mm (1 in.). The netting shall be entwined with the excelsior mat for
maximum strength and ease of handling. The minimum roll width shall be 1.2 m (4 ft). The
mass of the material shall be not less than 0.39 kg/m² (0.72 lb/sq yd), constant mass, air dry.
The rolls shall be packaged with suitable protection for outdoor storage on the project site
in a manner which protects them from biodegradation prior to use.

Material furnished under this specification shall be covered by a type C certification
in accordance with 916.

(d) **Paper Mat.** Paper mat shall consist of a knitted construction of
photodegradable, polypropylene yarn with uniform openings interwoven with strips of
210 biodegradable paper.

The rolls shall be packaged with suitable protection for outdoor storage at a construction site in a manner which protects them from biodegradation prior to use.

The mass of the paper shall be a minimum of 0.069 kg/m² (0.125 lb/sq yd). Roll sizes shall have a minimum width of 1.5 m (5 ft).

220 Material furnished under this specification shall be covered by a type C certification in accordance with 916.

230 (e) **Straw Mat.** Straw mat shall consist of a machine produced mat consisting of at least 90 percent of the total dry mass being clean straw from agricultural crops, with the exception that up to 30 percent of the total dry mass may be coconut fibers in lieu of an equal percentage of straw. Paper or paper related products shall not be permitted as component in the straw mat. The straw shall be reasonably free from primary noxious weeds in accordance with 914.04. The straw shall be evenly distributed throughout the mat to form a thickness of 13 mm (1/2 in.) with a permissible variation of ± 3 mm (1/8 in.). The top side of the mat shall be covered with a photodegradable/biodegradable plastic mesh which shall be substantially adhered to the straw by a knitting process using photodegradable/biodegradable thread.

The rolls shall be packaged with suitable protection for outdoor storage at a construction site in a manner which protects them from biodegradation prior to use.

The average dry mass of the straw mat shall not be less than 0.4 kg/m² (0.7 lb/sq yd). The minimum roll width shall be 1.8 m (6 ft). Material furnished under this specification shall be covered by a type C certification in accordance with 916.

240 **914.06 Leguminous Inoculants.** The inoculants for treating leguminous seeds shall be standard pure culture of nitrogen fixing bacteria. They shall be no more than one year old at the time of use and shall be subject to approval. Directions of the manufacturer on containers of inoculants shall be followed when inoculating seed.

250 **914.07 Sod.** Sod shall consist of fibrous, well rooted, bluegrass, fescue or other approved grass cut to a height of 50 to 75 mm (2 to 3 in.). Edges of sod shall be cut cleanly, either by hand or machine, to a uniform minimum thickness of 19 mm (3/4 in.) or more. The roots shall be exposed in the sod strip to allow the sod to be handled without undue tearing or breaking. The sod strip shall be of a uniform width of no less than 406 mm (16 in.) and no less than 6.1 m (2 ft) in length. Sod shall be free from all primary noxious weeds in accordance with 914.04. Acceptance in the field before cutting shall not preclude rejection when delivered to the work if such contamination is found.

Nursery sod shall meet applicable requirements set out above and shall be a variety or blend of Kentucky bluegrass or fescue. It shall comply with nursery inspections and plant quarantine regulations of the states of origin and destination as well as with Federal regulations governing interstate movement of nursery stock. A valid copy of the certification of nursery inspection shall accompany each shipment.

914.08 Plant Materials. If the plant material is shown on the Schedule of Pay Items as plant, the Contractor shall submit its source of supply for each plant material for approval prior to delivery to the project site. This plant list shall include the name of the source of supply and the location where the plants were grown. A certification that the plants are available at this source, that the plants were grown at the prescribed location, and that there is a firm commitment for their purchase at the time of certification shall be provided. These procedures shall be followed for approval of alternate sources when the originally approved source is unable to furnish plants at the time when needed. Plants shall be in accordance with the requirements set out herein. Unless otherwise specified, all plant material shall be acquired from zones 4, 5, or 6. However, plant material shall be acquired from zones no further than 1/2 zone south of the zone in which the project is located. Hardiness zones shall be determined from the Plant Hardiness Zone Map, Miscellaneous Publications No. 1475, Agricultural Research Service, United States Department of Agriculture, published by the U. S. Government Printing Office, Washington, D.C. The Contractor shall have a copy of this map.

If the plant material is shown on the Schedule of Pay Items as seedlings, the Contractor shall choose a source which is shown on the approved list of sources that is maintained by the Department. This list will specify the sources that are currently on an immediate use basis. If the source is not on the list, then the same procedure shall be followed as stated above for plants to obtain approval.

(a) Quality of Plant Materials. All plants shall be first class and representative of the normal species or varieties, true to type, and standard form. Unless otherwise specified, all plants shall be nursery grown stock that had been transplanted or rootpruned 2 or more times according to the kind and size of plant. The root system shall be vigorous and well developed. The branch system shall be developed normally. All plants shall be free from disfiguring knots, sun-scald, injuries, abrasions of the bark, dead or dry wood, broken terminal growth, or other objectionable disfigurements.

(b) Plant Names. Plants shall be true to name, following standard botanical and common nomenclature as adopted by the American Joint Committee on Horticultural Nomenclature given in the current edition of Standardized Plant Names. All trees delivered shall be tagged legibly with the names and sizes of the trees.

All delivered shrubs shall be tagged legibly with the name and size of the shrub when "Tag Each" is indicated on the summary list. Otherwise, each bundle shall be tagged. If shrubs are separated individually when delivered, 20 percent of each species shall be tagged. A tag with the name and size of the shrub printed thereon shall be used for each species. A 25 mm (1 in.) band of non-toxic paint shall be applied to the stem of seedlings or "whips," prior to delivery, in lieu of tags. If tags are required, they shall remain attached to shrubs for the duration of the contract.

(c) Substitutions. Substitutions of plants in size and kind shall be made only after proper execution of an extra work agreement and then only when sufficient evidence has been shown that the specified stock could not be secured.

(d) Grading Standards. Grading of plants shall be in accordance with the

310 American Association of Nursery Horticultural Standards of the current ASNS, ANSI Z 60.1 as revised herein and on the plans.

(e) **Nursery Inspection and Plant Quarantine.** All plants shall be free from plant diseases and insect pests. Shipments of plants shall be in accordance with nursery inspection and plant quarantine regulations of the states of origin and destination as well as with Federal regulations governing interstate movement of nursery stock. A valid copy of the certification of inspection shall accompany each package, box, bale, or carload shipped or otherwise delivered.

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(f) **Balled and Burlapped Plants.** Balled and burlapped plants shall be dug so as to retain as many fibrous roots as possible and shall come from soil which forms a firm ball. The soil in the ball shall be the original and undisturbed soil in which the plant was grown and shall be free of noxious weeds and weed seeds. The plant shall be dug, wrapped, transported, and handled in such a manner that the soil in the ball will not be loosened enough to cause stripping of the small and fine feeding roots or cause the soil to drop away from such roots. Any indication of manufactured earth balls or mishandling of the plant will be cause for rejection. The shape and size of the ball shall be as specified in the ASNS as revised herein and shown on the plans.

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(g) **Container Grown Plants.** Plants which are furnished in containers shall be well rooted and established in the container in which they were shipped. An established container grown plant shall be a plant transplanted into a container and grown in that container sufficiently long for the new fibrous roots to have developed so that the root mass retains its shape and holds together when removed from the container.

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(h) **Bare Rooted Plants.** The minimum root system of bare rooted trees or shrubs shall be in accordance with the standards stated in the ASNS. Bare rooted plants shall be dug only when the air temperature exceeds 2 °C (35 °F). Particular attention shall be given to the fibrous roots. The maximum time lapse between loading for shipment and delivery to the work or approved storage site shall be 4 days unless other shipping arrangements are approved.

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(i) **Collected Plants.** Collected plants, when specified in connection with any species or variety, shall not be nursery grown, but shall have been grown under natural conditions at the location from which they were procured. They may be balled and burlapped or bare roots as specified in the plant list on the plans. In either case, the collected material shall be in accordance with the applicable requirements given in the current issue of ASNS for quality, size, ball, and grade.

(j) **Forms, Shapes, and Condition of Plants.** Vines and groundcover plants shall be in accordance with grades and specifications shown in the ASNS unless otherwise specified.

Plants which have been cut back from larger grades to meet specifications will not be acceptable. Plants designated on the plans as street trees, specimen, extra heavy, clump, or of other like import shall be in accordance with the standards as given in the ASNS for the special type specified.

Trees shall have straight trunks, be well branched, and have symmetrical tops. There shall be no cuts of limbs over 19 mm (3/4 in.) in diameter which have not completely healed over. Each tree shall have the top and root characteristics of its variety and growth that are typical of such trees in this region. Deciduous trees, unless otherwise specified, shall have branching between 1/4 and 1/2 of the distance of their height from the ground. Street trees, if so specified, shall be of uniform branching height. Bush form, when specified, shall be branching at the base of the plant or within 300 mm (12 in.) of the base. Clumps, when specified, shall have 3 or more main leaders or trunks starting at the ground. At least 2 of these shall be of the caliber specified.

(k) Inspection. Plant materials shall be subject to inspection at any time during the life of the contract. Such inspection shall not be construed as final acceptance of the plants involved. Any stock which is not in accordance with these specifications will be rejected and shall be removed from the project.

Balled and burlapped plants may have the ball opened for inspection, at the option of the Department, to determine if the root system is sufficient to ensure plant growth. If after breaking open, the ball is found to be acceptable, payment for the destroyed plant will be made at 50 percent of the contract price for the plant involved.

Nursery stock may be inspected at the nursery before digging or shipping and sealed with Department seals. If not inspected and sealed at the nursery, it shall be done at a final collecting point at or adjacent to the project and prior to planting, unless otherwise specified in writing. Notification shall be made a minimum of 3 days in advance of delivery of unsealed plants. Large quantities of small plant material such as shrubs, seedlings, vines, groundcovers, etc., shall be sealed in a satisfactory manner. Sealing of plants shall not be considered as final acceptance and shall not waive the responsibility to furnish, plant, and maintain material that complies with the specifications.

(l) Shipment. All precautions that are customary in good trade practice shall be taken to ensure the arrival of the plants in good condition. Plants shall be packed or covered in such a manner as to ensure adequate protection against damage while in transit. The roots of bare root plants shall be protected with wet straw or other suitable material to ensure the arrival at destination with the roots in a moist condition. When shipment is made in an enclosed vehicle, the vehicle shall be adequately ventilated to prevent over heating of the plants in transit.

(m) Certification. Certifications from all plant supply sources shall be furnished certifying that all plants furnished are in accordance with 914.08. These certifications shall be submitted monthly, shall be notarized, and shall contain the information as indicated on the suggested form in 916.03(a).

914.09 Miscellaneous Material.

(a) Water. Water used in the planting or care of vegetation shall be free from oil, acids, alkalis, salts, or any substance injurious to plant life. Water from streams, lakes, ponds, or similar sources shall not be used unless approved.

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(b) Stakes for Bracing and Anchoring. Wood stakes for bracing or supporting trees shall be of rough cypress, cedar, locust, oak, or other approved wood free from knots, rot, cross grain, or other defects that would impair the strength of the stake for which it is to be used. Wood stakes shall be a minimum of 50 mm by 50 mm (2 in. by 2 in.) square in cross section and of adequate length. The wood bracing stakes shall be painted or stained dark green. Delineator posts in accordance with 910.15 may be used except they shall be painted dark green.

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An alternate staking and bracing method using a solid rubber support cord with metal hooks and stakes, and plastic stake disk system, may be used.

(c) Tree Wound Dressing. Dressing for treating tree wounds or cuts shall be either:

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1. An approved black asphaltum base antiseptic paint
2. An approved black paint consisting of Bordeaux Mixture, raw linseed oil, and lampblack
3. An approved black paint consisting of zinc oxide, raw linseed oil, and lampblack

(d) Porous Material. Porous material for tree root protection may be gravel, crushed stone, slag, or other porous material varying in size from 25 to 75 mm (1 to 3 in.) and shall be approved before being used.

(e) Pipe. Pipe for underdrains shall be in accordance with 907 or 908. The size and type shall be as specified.

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(f) Staples. Staples shall be made from 3.0 mm (No. 11 gage) or heavier wire, width 25 or 50 mm (1 or 2 in.) at the throat and 150 mm (6 in.) from top to bottom after bending. The staples shall be packaged in cartons.

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(g) Plastic Net. Plastic net shall consist of photodegradable, longchain synthetic polymer plastic yarn, either extruded oriented or woven into a net with the yarns fixed at each intersection such that they retain their relative positions with respect to each other. The plastic net shall have a square mesh opening of approximately 19 mm by 19 mm (3/4 in by 3/4 in.). The plastic net shall have a minimum tensile strength of 89 N (20 lbs) over a 75 mm (3 in.) width in the machine direction and 67 N (15 lbs) over a 75 mm (3 in.) width in the transverse direction. The plastic net shall have a nominal mass of 15.6 ± 2.2 g per m² (2.8 ± 0.4 lbs per 1000 sq ft). The plastic net shall be furnished in rolls which can be easily handled and the rolls shall be packaged in a suitable protection for outdoor storage at a construction site, which protects the material from degradation prior to use. Roll sizes shall have a minimum width of 1.8 m (6 ft).

Material furnished under this specification shall be covered by a type C certification in accordance with 916.

SECTION 915—BRIDGE PILES AND BEARINGS**915.01 Steel Shell Encased Concrete Piles and Epoxy Coated Steel Shell Encased Reinforced Concrete Piles.**

(a) General Requirements. Steel shell encased concrete piles and epoxy coated steel shell encased reinforced concrete piles, as designated herein, shall consist of fluted steel, or rounded straight seamed, spiral seamed, or seamless steel pipes which, after being driven, are filled with class A concrete. The steel shell encasement shall be uncoated unless an epoxy coating, in accordance with 915.01(d) is specified.

Steel pile shells shall be of the diameter and minimum wall thickness shown on the plans. All sections shall be one integral piece, substantially cylindrical, except as otherwise required for end sections of the outside diameter specified. All steel pile shells shall be of sufficient strength to withstand driving to the required penetration and bearing.

The tips of shells shall be equipped with conical driving points or flat closure plates. Conical driving points shall be of sufficient dimensions to ensure adequate joint and driving strength. The end of the shell shall have full bearing on the face of the point or against a shoulder inside the point. Unless otherwise permitted, the point shall be conical with a 60 to 90 degrees angle between faces. The point shall be substantially of the same diameter as the end of the shell and butt welded to the end of the lowest section.

If flat closure plates are used, they shall be non-reinforced and of a minimum thickness of 19 mm (3/4 in.) for shells 324 mm (12 3/4 in.) outside diameter and smaller, and 25 mm (1 in.) thick for shells 356 mm (14 in.) outside diameter. For shells larger than 356 mm (14 in.) outside diameter, the plates shall be designed to meet the particular cases. Flat plates shall have a diameter approximately 13 mm (1/2 in.) greater than the diameter of the shell and be fillet welded to the shell, using two passes or beads.

If necessary to facilitate handling, shells may be furnished in sections to be welded in the field to form the final integral lengths required.

The manufacturer shall provide a mill certification showing heat numbers and test results for the specified tests. Each pile shall be stenciled to show the diameter, wall thickness, and heat numbers for the verification of the certifications. The certifications be delivered before the pile shells are driven.

(b) Fluted Steel Pile Shells. Fluted steel pile shells shall have a minimum tensile strength of 345 MPa (50,000 psi) when tested in accordance with ASTM A 370. Test specimens for determination of tensile strength shall be taken longitudinally adjacent to the crest of the flute. The diameter of fluted steel shells shall be measured from crest to crest of flutes.

A sufficient taper will be allowed to permit no less than 150 mm (6 in.) telescoping at the joints. The lowest section shall taper approximately 25 mm (1 in.) in 1.2 m (4 ft) from an 203 mm (8 in.) tip to the specified diameter of the upper end. Fluted steel pile shells with a taper of 25 mm (1 in.) in 2.1 m (7 ft) on the lowest section of long piles may be used provided a minimum of approximately 1.5 m (5 ft) of the top of the pile below cutoff elevation is the full diameter as shown on the plans.

(c) Rounded Steel Pipe Shells. Rounded steel pipe shells, except for end finish, shall be in accordance with ASTM A 252, grade 2 or 3. Welded pipe may be welded with straight or spiral seams.

(d) Epoxy Coating for Piles. Only powdered epoxy resin from the Department's list of approved coating materials shall be used for the epoxy coating of steel pile shells, steel H piles, and for all reinforcing steel contained within reinforced concrete piles or reinforced concrete encasement.

The patching or repair material shall be compatible with the coating and shall be made available by the coating manufacturer. The material shall be suitable for repairs made to coated areas damaged during fabrication or handling.

The coating color shall contrast with the color of iron oxide. All coated piles furnished for a structure shall be the same color. The patching or repair material shall also be the same color as the original coating material.

1. Prequalification of Organic Coatings for Steel Piles. The coating product shall be a 100 percent solids, heat curable, thermosetting, dry powered epoxy coating. Coating manufacturers who request to have their product added to the Department's list of approved epoxy coatings for steel shall supply the information as follows:

a. Product Data Sheet. A product data sheet which shall specify the method of surface preparation, the thermal treatments before and after coating application, the coating application procedure, and the product name and description of the patching material.

b. Fingerprint. The fingerprint shall include the method of test, such as infrared spectorscopy or thermal analysis, and a generic description of the product.

c. Materials Safety Data Sheets. Current Materials Safety Data sheets shall be supplied for the product and the patching material.

d. Laboratory Report. A dated laboratory report which shall substantiate full compliance with the following test requirements.

(1) Tensile Strength and Elongation. The tensile strength and elongation of the coating material shall be tested in accordance with ASTM D 2370 with a rate of elongation of 10 to 20 percent per minute. The minimum tensile strength shall be 56 MPa (8,000 psi). The minimum elongation shall be 5 percent.

100 **(2) Impact Resistance.** The impact resistance of the coating shall be tested in accordance with ASTM G 14 using a 16 mm (5/8 in.) diameter tip, and a 0.03 mm (12 mil) minimum coating thickness of a 3.2 mm (1/8 in.) thick panel at 23 °C (73 °F). Three tests shall be performed. The minimum acceptable value shall be 9.0 N·m (80 Lbf in.) of impact with no visible breaks in the coating.

(3) Abrasion Resistance. The abrasion resistance of the coating shall be tested by means of a Tabor Abraser or its equivalent, using CS-10 wheels and a 1,000 g (2.2 lb) load. The maximum allowable mass loss shall not exceed 100 mg per 1,000 cycles.

(4) Salt Fog. The weathering resistance of the coating shall be tested by means of a salt spray cabinet following ASTM B 117 for 1,000 hours. The coating shall not blister or exhibit corrosion, discoloration, or loss of adhesion away from the scribed area.

110 **2. Application.** The application of the epoxy coating shall be at an enclosed plant, equipped with environmental controls and automated blasting equipment. This equipment shall facilitate surface preparation and coating application in accordance with the manufacturer's recommendations and in accordance with additional requirements set out herein. The application process shall be performed by a continuous, balanced system where cleaning of the surface and application of the coating are performed at the same rate.

120 **a. Surface Preparation.** The pile surface shall be blast cleaned in conformance with SSPC-SP-10 Near White Metal Blast. The cleaning media shall produce an anchor pattern profile of 50 µm (2 mils) minimum. Any raised slivers, scabs, laminations or bristles of steel remaining on the newly cleaned surface shall be removed by abrasive sanders. All traces of grit and dust from the blasting shall be removed.

b. Coating Application. The coating shall be applied immediately to the cleaned surface and before visible oxidation of the surface occurs. The coating shall be applied in accordance with the manufacturer's recommendations. The recommendations shall address the equipment required for proper application, the number of coats of epoxy, cure time between coats, cure time before placing in service, and any other information needed by the Department to ensure proper performance of the material.

130 **(1) Thickness.** Thickness of the cured coating shall be measured on a representative number of piles from each production lot by the same method required by ASTM G 12 for measurement of film thickness of pipeline coatings on steel. The minimum coating thickness for fusion bonded epoxy shall be 200 µm (8.0 mils) for individual measurements and 300 µm (12 mils) for the average.

(2) Cure. The coating film shall be cured and post cured in accordance with the manufacturer's recommendations. A representative proportion of each production lot shall be checked by the coating applicator using a method found most effective for measuring cure to ensure that the entire production lot is in a fully cured condition.

(3) **Continuity of Coating.** After cure, the epoxy coating shall be checked by the applicator for continuity of coating and shall be free from holes, voids, contamination, cracks, and damaged areas. There shall not be more than two holidays, which are pinholes not visually discernible, in any linear foot of the coated pile. A holiday detector shall be used in accordance with the manufacturer's instructions to check the coatings for holidays. A 67 1/2 volt Tinker and Rasor Model M-1 detector or its equivalent shall be used.

150 **3. Certification.** Material furnished under this specification shall be covered by a type C certification in accordance with 916. In addition, a certificate of compliance prepared by the applicator shall be furnished for each shipment of coated piles. The certificate of compliance shall state that the piles have been coated in accordance with the manufacturer's requirements; that thickness, continuity, and flexibility tests of the coating have been performed; and that the test results comply with the requirements outlined herein. Test results shall be retained by the applicator and made available for inspection upon request for a period of seven years.

160 **915.02 Steel H Piles and Epoxy Coated Steel H Piles.** Steel H piles and epoxy coated steel H piles shall be of the shape and dimensions shown on the plans or as otherwise specified. The steel shall be in accordance with AASHTO M 183. Steel H piling shall be handled in the same manner and with the same care as required in 711.55. The piles shall be uncoated unless an epoxy coating, in accordance with 915.01(d), is specified.

The manufacturer shall provide a mill certification showing heat numbers and test results for the specified tests. Each H pile shall be stenciled to show the manufacturer's name, the specifications, size and mass of section, and heat numbers for verification of the certification. The certification shall be submitted at the time of delivery of the piles.

170 **915.03 Wood Piles.** Wood piles shall be in accordance with 911.01(e) or 911.02(c) as specified.

915.04 Elastomeric Bearings.

(a) **Description.** Elastomeric bearings as herein specified shall include plain bearings, consisting of elastomer only, and laminated bearings, consisting of layers of elastomer restrained at their interfaces by bonded laminates. The grade of the material shall be as shown on the plans.

180 (b) **Materials.** The elastomer portion of the elastomeric compound shall be 100 percent virgin natural polyisoprene known as natural rubber, or 100 percent virgin chloroprene known as neoprene. The cured compound shall be in accordance with Table A for natural rubber, or Table B for neoprene, depending on which type is furnished. Compounds of nominal hardness between the values shown may be used and the test requirements interpolated. When test specimens are cut from the finished product, a ± 15 percent variation in tensile strength and ultimate elongation will be allowed.

TABLE A

ASTM Standard	Physical Properties Hardness ASTM D 2240 Tensile strength, min.(psi) ASTM D 412 kPa Ultimate elongation, min. %	50 Duro 50 ± 5 (2500) 17,240 450	60 Duro 60 ± 5 (2500) 17,240 400	70 Duro 70 ± 5 (2500) 17,240 300
	Heat Resistance			
D 573	Change in durometer hardness, max. points	+10	+10	+10
70 hr.	Change in tensile strength, max %	-25	-25	-25
@ 70 °C (158 °F)	Change in ultimate elongation, max. %	-25	-25	-25
	Compression Set			
D 395 Method B	22 hours @ 70 °C (158 °F), max. %	25	25	25
	Ozone			
D 1149	25 ppm ozone in air by volume, 20% strain 38 °C ± 1 °C (100 °F ± 2 °F), 48 hours, mounting procedure D 518, Procedure A	No Cracks	No Cracks	No Cracks
	Adhesion			
D 429, B	Bond made during vulcanization, kg/m (lbs/in.)	714 (40)	714 (40)	714 (40)
	**Low Temperature Test			
	Bearing or sample preparation 96 hours @ -29°C ± 1°C (-20°F ± 2 °F), axial load 3,450 kPa (500 psi) and strain of 20% "T"* Test Recorded shear resistance after 1 hour (min.) at 25% shear strain kPa (psi) shall not exceed	207 (30)	276 (40)	345 (50)

* Effective rubber thickness.

** Unless otherwise specified, the Low Temperature Test will be waived.

210

TABLE B

ASTM Standard	Physical Properties Hardness ASTM D 2240 Tensile strength, min. (psi) ASTM D 412 kPa Ultimate elongation, min. %	50 Duro 50 ± 5 (2500) 17,240 400	60 Duro 60 ± 5 (2500) 17,240 350	70 Duro 70 ± 5 (2500) 17,240 350
	Heat Resistance			
D 573 70 hr. @ (100pC) 212pF	Change in durometer hardness, max. points Change in tensile strength, max % Change in ultimate elongation, max. %	+15 -15 - 40	+15 -15 -40	+15 -15 -40
	Compression Set			
D 395 Method B	22 hours @ 100pC (212pF), max. %	35	35	35
	Ozone			
D 1149	100 ppm ozone in air by volume, 20% strain 38pC ± 1pC (100pF ± 2pF), 100 hours, mounting procedure D 518, Procedure A	No Cracks	No Cracks	No Cracks
	Adhesion			
D 429, B	Bond made during vulcanization, kg/m (lb/in.)	714 (40)	714 (40)	714 (40)
	**Low Temperature Test			
	Bearing or sample preparation 96 hours @ -29pC ± 1pC (-20pF ± 2pF), axial load 3,450 kPa (500 psi) and strain of 20% "T"* Test Recorded shear resistance after 1 hour (min.) at 25% shear strain kPa (psi) shall not exceed	345 (50)	517 (75)	690 (100)

220

* Effective rubber thickness.

** Unless otherwise specified, the Low Temperature Test will be waived.

Unless otherwise specified, laminates shall be rolled mild steel sheets in accordance with ASTM A 36 or ASTM A 570, grade 36.

230

(c) Manufacturing Requirements. Plain bearings may be molded individually, cut from previously molded strips or slabs, or extruded and cut to length. Cut edges shall be at least as smooth as ANSI B 46.1 No. 250 finish. Unless otherwise shown on the plans, all components of a laminated bearing shall be molded together into an integral unit. Edges of the nonelastic laminations shall be covered by a minimum of 3 mm (1/8 in.) of elastomer except at laminate restraining devices and around holes that shall be entirely closed on the finished structure. Air bubbles within the elastomeric material shall be cause for rejection.

240 Each bearing pad shall be marked permanently to show the manufacturer and the month and year of fabrication.

(d) Appearance and Dimensions. The class for finish and appearance, and flash tolerance, shall be RMA-F3-T.063 for molded bearings and RMA-F2 for extruded bearings in accordance with the requirements of the Rubber Handbook published by the Rubber Manufacturer's Association, Inc.

The permissible variation from the dimensions and configuration required by the plans for both plain and laminated bearings shall be as follows:

250	Overall Vertical Dimensions	
	Average Total Thickness 32 mm (1 1/4 in.)	
	or less	0, +3.2 mm (-0, +1/8 in.)
	Average Total Thickness Over 32 mm	
	(1 1/4 in.)	0, +6.4 mm (-0, +1/4 in.)
	Overall Horizontal Dimensions	-3.2 mm, +6.4 mm (-1/8 in., +1/4 in.)
	Thickness of Individual Layers Elastomer	
	(Laminated Bearings Only)	-1.6 mm, +1.6 mm (-1/16 in., +1/16 in.)
	Variations from a Plane Parallel to the	
260	Theoretical Surface	
	Top	3.2 mm (1/8 in.)
	Sides	6.4 mm (1/4 in.)
	Individual Non-Elastic Laminates	
	(As determined by measurements at the	
	edges of the bearing)	3.2 mm (1/8 in.)
	Position of Exposed Connection Members	3.2 mm (1/8 in.)
	Edge Cover of Embedded Laminates or	
	Connection Members	0, + 3.2 mm (-0, + 1/8 in.)
	Size of Holes, Slots, or Inserts	0, + 3.2 mm (-0, + 1/8 in.)
270	Position of Holes, Slots, or Inserts	0, + 3.2 mm (-0, + 1/8 in.)
	Thickness of Non-Elastic	
	Laminates	-0.8, + 1.6 mm (-1/32 in., + 1/16 in.)

(e) Quality Assurance. The mechanical properties of the finished bearing shall be determined by laboratory test by the manufacturer. The following values shall be used for control of laboratory testing of full size bearings:

- 280 1. Compressive strain of any layer of an elastomeric bearing shall not exceed 7 percent at 5.5 MPa (800 psi) average unit pressure or at the design dead load plus live load pressure if so indicated on the plans.
2. The shear resistance of the bearing shall not exceed 207 kPa (30 psi) for 50 durometer, 276 kPa (40 psi) for 60 durometer, or 345 kPa (50 psi) for 70 durometer, Table A compounds; nor 345 kPa (50 psi) for 50 durometer, 517 kPa (75 psi) for 60 durometer, or 758 kPa (110 psi) for 70 durometer, Table B compounds at 25 percent strain of the total

290 effective rubber thickness after an extended 4 day ambient temperature of
 -29°C (-20°F). Unless otherwise specified, the shear resistance test will
 be waived.

300 (f) **Certification.** Material furnished under this specification shall be covered by
 a type B certification in accordance with 916. In addition, one bearing pad from each type to
 be furnished for the structure will be required for laboratory testing. However, when shapes
 A and B of any type are required, only shape A need be furnished for testing. The material
 may be sampled prior to shipment to the project, provided suitable arrangements can be made
 through the Division of Materials and Tests. Materials not previously sampled and approved
 for use shall be sampled after delivery to the project. Samples shall be furnished at least 30
 days before date of use.

SECTION 916—MATERIALS CERTIFICATIONS

916.01 General. Materials certifications will be required for certain materials in
 accordance with various sections of these specifications and other contract documents. If the
 subject material is not listed in 916.02, the applicable specification reference should be
 reviewed. Unless otherwise specified or directed, one copy of each certification shall be
 submitted prior to use of the material. All certifications shall be sworn to by a person having
 legal authority to bind the company preparing the certification and shall be notarized.

10 The contract number, name of the contractor, destination to which the material
 covered by the certification is consigned, and name and quantity of material represented shall
 be shown on all copies of the certification. Identifying information such as alloy, grade, type,
 class, or other similar designation shall also be shown when applicable.

Any material received on the project for which certification has been furnished may
 be sampled and tested. If the results of the tests are in disagreement with the certification, the
 test results shall prevail and further acceptance by certification from the manufacturer of the
 material concerned may be suspended.

20 **916.02 Types of Certifications.** Certifications shall be type A, type B, type C or as
 required under other types. Sample forms for type A, type B, and type C certifications are
 shown in 916.03.

30 (a) **Type A.** Type A certification shall be prepared by the manufacturer. It shall
 consist of a certified copy of a laboratory report which lists results of the specified tests and
 shall certify that the materials furnished comply with the specifications. The applicable
 specification shall be referred to in the certification. The tests may be conducted in the
 laboratory of the manufacturer or in another qualified laboratory. Such tests shall have been
 conducted on samples obtained from the lot or lots of material in the shipment. Type A
 certifications will be required for the following materials:

100% Solid Epoxy	913.14(b)3
Barrier Delineators	913.08(c)
Bronze Castings, 4 copies required	910.06(a)

	Copper Alloy Plates, 4 copies required	910.06(b)
	High Mast Poles 913.11(b)1	
40	Perforated Plastic Semi-Circular Pipe	907.18
	Plastic Corrugated Drainage Pipe	907.17
	Preformed Elastomeric Joint Seals	906.02(a)3
	Seven-Wire Strand for Prestressed Concrete	910.01(b)7
	Single Component, Low Modulus Silicone Sealant	906.02(a)1d

(b) **Type B.** Type B certification shall be prepared by the manufacturer. It shall show the limits of test values for the specified tests and shall certify that the materials furnished comply with the specifications. The applicable specification shall be referred to in the certification. The tests may be conducted in the laboratory of the manufacturer or in another qualified laboratory. Type B certifications will be required for the following materials:

	Acrylonitrile-Butadiene-Styrene (ABS) Composite	
	Sewer Piping	907.15
	Acrylonitrile-Butadiene-Styrene (ABS) Sewer Pipe	
	and fittings 907.16	
	Bituminous Material for Coating Corrugated Steel or	
	Aluminum Pipe, Pipe Arches, or Underdrains	908.07
	Elastomer for Expansion Joint	906.06
	Elastomeric Bearings, 4 copies required	915.04(f)
60	Epoxy Adhesive	913.14(d)1b(2)
	Fiberglass Reinforced Plastic Sign Panels	913.10(g)
	Latex Modifiers	912.04
	Marker Adhesive Patching Material	913.14(d)1c(3)
	Prismatic Reflector for Raised Pavement Markers	913.14(d)1a(8)
	PVC Corrugated Sewer Pipe with a	
	Smooth Interior	907.20
	PVC Sewer Pipe Type PSM SDR-35	907.19
	Rubber Type Gaskets	906.04
	Steel, Flanged, Channel Sign Post	910.14(a)1
70	Welded Steel Wire Fabric for Reinforced Concrete	
	Elliptical Culvert, Storm Drain, and Sewer Pipe	907.03
	Welded Steel Wire Fabric for Reinforced Concrete	
	Pipe	907.02

(c) **Type C.** Type C certification shall be prepared by the manufacturer and shall certify that the materials furnished are in accordance with the specifications. The applicable specification shall be referred to in the certification. Type C certifications will be required for the following materials:

80	Acrylic Plastic Delineators, when sampling is	
	not required	913.08(a)
	Backer Rod	906.02(b)2
	Barrier Delineators	913.08(c)

	Bituminous Mastic Pipe Joint Sealer	906.05(c)
	Bonding Agent, for grout finish	707.06
	Bronze or Copper Alloy Plates	910.17
90	Compound Used in Manufacturing Perforated Plastic Semi-Circular Pipe	907.18
	Construction Warning Lights	913.12(h)
	Disconnect Hanger	913.15(d)3
	Durable Marking Material	913.14(b)1c
	Epoxy Coating, Reinforcing Steel	910.01(b)9
	Epoxy Coating, Piles	915.01(d)2
	Epoxy Coating Materials	910.01(b)9
	Epoxy-Resin Bonding System	909.11
100	Excelsior Blanket	914.05(c)
	Fabric for Waterproofing	913.16
	Flexible Roll-up Prismatic Reflective Sign	913.10(c)9
	Geotextiles For Use Under Riprap	913.18
	Geotextiles For Use with Underdrains	913.19
	Geotextiles For Silt Fences	913.20
	Geotextiles For Use With Underdrains	913.19
	Guardrail, including rails, posts, accessories, fittings, and hardware	910.12(b)
	Highway Illumination Materials	913.11(h)
110	Lubricant-Adhesive for Preformed Elastomeric Joint Seals	906.02(a)3
	Overhead Sign Structures	910.19
	Paper Mat	914.05(d)
	Preformed Plastic Pavement Marking	913.14(b)2c
	Plastic Net	914.09(g)
	Polyurethane Sealant for Expansion Joint	906.06(a)
	Reflective Sheeting Delineators	913.08(b)
	Right-of-Way Markers	615.03
	Signal Mast Arm Structures	913.15(e)3h
	Snowplowable Raised Pavement Marker Base	913.14(d)1b(2)
120	Steel Drain Pipe, 4 copies required	910.07
	Steel Pipe	908.11
	Straw Mat	914.05(e)
	Structural Aluminum Sign Posts	910.14(c)
	Structural Steel for Expansion Joint	906.06
	Structural Steel Sign Posts	910.14(b)
	Temporary Pavement Marking Tape	913.14(c)
	Temporary Raised Pavement Marker	913.14(d)2e
	Thermoplastic Pavement Markings	913.14(b)1c
	Traffic Signal Materials and Equipment	913.15(k)
130	Traffic Signs, including Reflective Sheeting Materials and Construction Signs	913.10(g)
	Wood Cellulose fiber	914.05(a)
	Zinc Chromate Paint, quantities greater than 3.8 L (1 gal)	909.07(c)

(d) Other Types. Types of certifications other than type A, B, and C are specified for the following materials in the referenced sections:

140	Admixtures for Use in Concrete	912.03(c)
	Buy American Certification. Sample Form shown in	
	915.03(d)	106.01(a)
	Castings	910.05
	1. Carbon Steel Castings	910.05(e)
	2. Chromium Alloy Steel Castings	910.05(a)2
	3. Ductile Iron Castings	910.05(c)
	4. Iron Castings	910.05(b)
	5. Malleable Iron Castings	910.05(d)
	6. Steel Castings for Highway Bridges	910.05(a)1x
150	Certification Traffic Control Units	
	1. Certification of Environmental Testing	913.15(a)6f(2)
	2. Certification of Production Run Model	913.15(a)6f(1)
	Dowel Coating	910.01(b)10
	Epoxy Coated Reinforcing Steel	910.01(b)9
	Fly Ash Source. Sample form shown in 915.03(e)	901.02(b)3
	Geotextiles for Use Under Riprap	913.18
	Sample form shown in 915.03(g)	
	High Mast Poles, Base Plate, and Shaft	913.11(b)1
	High Strength Bolts, Nuts, and Washers	910.02(e)2d
160	Inorganic Zinc Silicate Formulation	909.02(d)4
	Metal Pipe	
	1. Bituminous Coated Corrugated Steel or Aluminum Pipe, Pipe-Arches, or Underdrains-same as for uncoated	908.07
	2. Corrugated Aluminum Alloy Culvert Pipe and Pipe-Arches	908.04
	3. Corrugated Aluminum Alloy Pipe for Underdrains	908.05
170	4. Corrugated Steel Culvert Pipe and Pipe-Arches	908.02
	5. Corrugated Steel Culvert Pipe for Underdrains	908.03
	6. Metal End Sections	908.06
	7. Structural Plate Pipe, Pipe-Arches Underdrains-same as for uncoated	908.07
	Nursery Sod. Sample form shown in 915.03(b)	914.07
	Plants. Sample forms shown in 915.03	914.08(e) 914.08(m)
	Portland Cement. Sample forms shown in 915.03(f)	901.01(b)
180	Proprietary Portland Cement Concrete Sealers	909.10
	Reflective Sheeting	913.10(f)
	Reinforced Concrete Pipe	907.02 907.03

	Sign Posts, Other Steel	910.14(a)1
	Signal Head	913.15(d)1e
	Steel Forgings and Steel Shafting	910.04(d)
	Steel Piles	
190	1. Fluted Steel Shells, 4 copies required	915.01(a)
	2. Rounded Pipe Shells, 4 copies required	915.01(a)
	3. Steel H Piles, 4 copies required	915.02
	Structural Steel, 4 copies required	711.08
		910.02(d)
	Temporary Worksite Speed Limit Sign Assembly	801.04
	Transformer Base	913.11(a)6
	Welder's Certification	910.19(a)
		803.07(j)

200

(e) Requirements for Small Quantities of Materials. Where circumstances warrant and previously approved material is not available, small quantities may be accepted either by a type C certification or by an affidavit from the supplier stating that the material offered is equal to that specified.

(f) Buy American Requirement. All steel products used in the contract shall be certified to be in accordance with 106.01(a).

210 **916.03 Sample Forms.****(a) For Plants.****CERTIFICATE OF COMPLIANCE FOR PLANTS**

I hereby certify that the following listed plants which were supplied to _____ for contract No. _____ comply with Indiana Department
Contractor
of Transportation specifications set out in subsection 913.08.

220

(The number and species of plants supplied shall be listed in this space. The species shall be the exact pay item, including the Latin name.)

I understand that State and/or Federal funds are involved in the work in which this material will be used and that any misrepresentation on my part constitutes fraud.

Date_____
Company of Grower

230

Signature of Company Official

STATE OF _____)

COUNTY OF _____)

240

Personally before me, a Notary Public in and for the above said State and County, did appear _____ on the day of _____, 19____ and sign the above Certificate.

Notary Public

My Commission expires _____

I certify that the plants listed above are those used on contract _____.

250

Date_____
Signature of Contractor

(b) For Certificate of Nursery Inspection.

**CERTIFICATE OF NURSERY INSPECTION
INDIANA DEPARTMENT OF NATURAL RESOURCES,
DIVISION OF ENTOMOLOGY**

260 No. _____ Indianapolis, Indiana, Date _____

This is to certify that the nursery stock grown by _____ located at _____, Indiana, consisting of _____ hectares (_____ acres), has been inspected by the undersigned or his authorized representative, on _____, 19____ in compliance with Indiana Code 15-4-7, and has been found apparently free from destructively injurious insects and plant diseases.

This certificate covers _____ and is valid, unless revoked for cause until October 1, 19____.

270 Signed _____ State Entomologist

(c) For Welding Electrodes.

WELDING ELECTRODE CERTIFICATION

280 _____
Manufacturer's Name and Address

Supplied to: _____

Date _____ Quantity _____ Order No. _____ Project No. _____

290 This is to certify that _____ ASTM-AWS classification (EXXX) as
trade name
supplied under the above order number, is of the same classification, manufacturing process,
and material requirements as the electrodes tested on _____, 19____.

All tests required by specification AWS A5.1 or AWS A5.5 were performed in accordance with this specification and the above electrode met all the requirements. The electrodes are marked in accordance with AWS A5.1 or AWS A5.5.

The chemical and mechanical properties of the deposited weld metal were as follows:

	4 mm (5/32 in.)		5 mm (3/16 in.)		6 mm (1/4 in.)	
	DC+	AC	DC+	AC	DC+	AC
Tensile Strength kPa (psi)						
Yield Strength kPa (psi).						
Elongation % in 2k						
Charpy V Notch N m (Ft Lbs) at _____ pC (pF)						
Manganese %						
Silicon %						
Nickel %						
Chromium %						
Molybdenum %						
Vanadium %						
Fillet Tests Position as required						
Radiographic Test						
Fillet Test, Radiograph, Chemistry, and Mechanical Properties are not required for the following sizes: _____						

Operations supervised by _____

Chief Engineer _____

Director _____

STATE OF _____)

COUNTY OF _____)

Personally before me, a Notary Public in and for the above said State and County, did appear _____ on the day of _____, 19____ and sign the above Certificate.

Notary Public

My Commission Expires: _____

(d) For Buy American Requirement.**BUY AMERICAN CERTIFICATION**

In accordance with Indiana Department of Transportation Specification 106.01(a), I hereby certify that all steel products incorporated in Contract No. _____ were produced and manufactured in the United States of America or territories subject to its jurisdiction.

Date

CONTRACTOR

SIGNATURE

STATE OF _____) SS:

COUNTY OF _____)

Subscribed and sworn to before me by _____ of the firm
of _____ this ____ day of _____ 19____.

Notary Public

My Commission Expires: _____

(e) For Fly Ash Source Certification.**FLY ASH SOURCE CERTIFICATION**

This is to certify that all class _____ fly ash, produced by
(F or C)

the _____ Power Plant of _____,
(Name and/or Unit No.) (Power Company)

located in _____, _____, shipped for
(City) (State)

use on Indiana Department of Transportation projects will be produced under appropriate quality control and will comply with all AASHTO M295 Specifications and Indiana Department of Transportation Standard Specifications requirements.

_____ also agrees that any part of the above named
(Power Company)

power plant associated with the production of such fly ash may be checked at regular intervals by properly identified representatives of the Indiana Department of Transportation.

As an approved source of fly ash, _____
(Power Company)

390 shall be in accordance with the Indiana Department of Transportation Standard Specifications for all quality assurance testing and reporting requirements.

Date POWER COMPANY

SIGNATURE

400

State of _____) SS:

County of _____)

Subscribed and sworn to before me by _____
of the firm of _____ this ____ day of _____ 19__.

Notary Public

410

My Commission Expires: _____

(f) For Portland Cements and Blended Cements.

CEMENT CERTIFICATION

The _____
(manufacturer and location)

420

certifies the type _____ cement in this shipment
(type of cement)

conforms to the requirements of the Indiana Department of Transportation Standard Specifications; and

Source of Shipment _____ ;
(if other than production location)

Purchaser and/or Consignee _____ ;

430

Point of Delivery _____ ;

Silo Identification _____ ;

Carrier and Truck Number _____ ;

Date of Shipment _____ ;

Quantity of Cement in Pounds _____ ;

and Other Information _____ ;

_____ .

If Portland-Pozzolan cement, type IP or IP-A, is being shipped, the certification shall further state:

Class of ASTM C 618 Fly Ash _____ ; and Percentage of Pozzolan _____ % based on the mass of the Portland-Pozzolan cement.

Date

SIGNATURE

(g) For Geotextiles Used Under Riprap.

CERTIFICATION FOR GEOTEXTILES USED UNDER RIPRAP

_____ is a (woven or non-woven) geotextile consisting of strong, rot resistant, chemically stable long-chain synthetic polymer material dimensionally stable with distinct and measurable openings. The plastic yarn or fibers used in this geotextile consist of a longchain synthetic polymer composed of at least 85 percent by mass of polyolefins, polyesters, or polyamides; and contains stabilizers and inhibitors added to the base plastic to make the filaments resistant to deterioration due to ultraviolet and heat exposure. This geotextile is calendered or otherwise finished so that the yarns or fibers will retain their relative position with respect to each other.

I hereby certify that _____ primary sampling units were selected in accordance with ASTM D 4354, to represent _____ m² (_____ sq yds) of _____ geotextile, Lot No. _____. The results of testing each primary sampling unit are reported as follows:

<u>TEST</u>	<u>METHOD</u>	<u>RESULTS*</u>
Tensile Strength	Grab Tensile Strength ASTM D 4632	_____ N (_____ lbs)
Elongation	Grab Tensile Strength ASTM D 4632	_____ %
Bursting Strength	Mullen Burst ASTM D3786	_____ kPa (_____ psi)
Puncture Strength	ASTM D 4833	_____ N (_____ lbs)
Trapezoid Tear	ASTM D 4533	_____ N (_____ lbs)

Ultraviolet Degradation
at 150 hours

ASTM D 4355

_____ %
strength retained
for all classes

Apparent Opening
Size (AOS)

ASTM D 4751

_____ AASHTO Std.
Metric Sieve size

490

Permeability**

ASTM D 4491
(permittivity)

_____ mm/sec

*Values represent weaker principal direction where applicable.

**The nominal coefficient or permeability was determined by multiplying permittivity value by nominal thickness. The nominal thickness is measured under a normal load of 1.93 MPa (280 psi).

I understand that State and/or Federal funds and/or services are involved in the work in which this material will be used and that any misrepresentation on my part constitutes fraud.

500

Date

Manufacturer's Name

Signature of Manufacturer's Official

State of _____

Title of Official

510

Personally before me, a Notary Public in and for the above said State and County, did appear _____ on the _____ day of _____, 19____ and sign the above Certificate.

Notary Public

My Commission expires _____

(h) For Geotextiles Used With Underdrains.

520

CERTIFICATION FOR GEOTEXTILES USED WITH UNDERDRAINS

_____ is a non-woven needle punched or heat bonded geotextile consisting of strong, rot resistant, chemically stable long-chain synthetic polymer materials, dimensionally stable with each other including selvages. The plastic yarn or fibers used in this geotextile consist of at least 85 percent by mass of polyolefins, polyesters, or polyamides; and contain stabilizers and inhibitors added to the base plastic to make the filaments resistant to deterioration due to ultraviolet and heat exposure.

I hereby certify that _____ primary sampling units were selected in accordance with ASTM D 4354, to represent _____ m² (_____ sq yds) of _____ geotextile, Lot No. _____. The results of testing each primary sampling unit are reported as follows:

	<u>TEST</u>	<u>METHOD</u>	<u>RESULTS*</u>
	Tensile Strength	Grab Tensile Strength	
		ASTM D 4632	_____ N (_____ lbs)
540	Seam Strength	ASTM D 4632	_____ N (_____ lbs)
	Bursting Strength	Mullen Burst	
		ASTM D3786	_____ kPa (_____ psi)
	Puncture Strength	ASTM D 4833	_____ N (_____ lbs)
	Trapezoid Tear	ASTM D 4533	_____ N (_____ lbs)
	Ultraviolet Degradation at 150 hours	ASTM D 4355	_____ % strength retained for all classes
550	Apparent Opening Size (AOS)	ASTM D 4751	_____ AASHTO Std.
	Metric Sieve size		
	Permeability**	ASTM D 4491	_____ mm/sec

*Values represent weaker principal direction where applicable.

**The nominal coefficient or permeability was determined by multiplying permittivity value by nominal thickness.

560 I understand that State and/or Federal funds and/or services are involved in the work in which this material will be used and that any misrepresentation on my part constitutes fraud.

Date

Manufacturer's Name

Signature of Manufacturer's Official

State of _____

Title of Official

570

Personally before me, a Notary Public in and for the above said State and County, did appear _____ on the _____ day of _____, 19____ and sign the above Certificate.

Notary Public

My Commission expires _____

(i) For Geotextiles Used With Silt Fence.

CERTIFICATION FOR GEOTEXTILE USED WITH SILT FENCE

_____ is a woven or non-woven geotextile consisting of strong, rot resistant, chemically stable long-chain synthetic polymer materials, which are dimensionally stable relative to each other including selvages. The plastic yarn or fibers used in the geotextile shall consist of at least 85 percent by mass of polyolefins, polyesters, or polyamides. The plastic yarn or fibers shall have stabilizers and inhibitors added to the base plastic to make the filaments resistant to deterioration due to ultraviolet and heat exposure.

I hereby certify that _____ primary sampling units were selected in accordance with ASTM D 4354, to represent _____ m² (_____ sq yd) of _____ geotextile, Lot No. _____. The results of testing each primary sampling unit are reported as follows:

TEST	METHOD	RESULTS ¹ Wire Fence Supported	Self Supported
<hr/>			
Grab Strength	ASTM D 4632	_____ kg (_____ lb)	_____ kg (_____ lb)
Elongation at 20.4 kg (45 lb)	ASTM D 4632	_____ %	
Apparent Opening Size	ASTM D 4751	_____ mm ** (_____ ***)	_____ mm ** (_____ ***)
Permit- tivity	ASTM D 4491	_____ sec ⁻¹	_____ sec ⁻¹
Ultraviolet Degradation at 500 hours	ASTM D 4355	_____% strength retained for all classes	_____% strength retained for all classes

* Values represent weaker principal direction where applicable.

** Metric standard sieve size.

*** U.S. Standard Sieve size.

I understand that State and/or Federal funds and/or services are involved in the work in which this material will be used. Misrepresentation on my part constitutes fraud.

630

Date_____
Manufacturer's Name_____
Signature of Manufacturer's Official

State of _____

County of _____

Title of Official

640

Personally before me, a Notary Public in and for the above said State and County, did appear _____ on the ____ day of _____, 19__, and sign the above Certificate.

Notary Public

My Commission expires _____, 19__

(j) Sample Type A Certification Form.

INDIANA DEPARTMENT OF TRANSPORTATION

650

TYPE A CERTIFICATE OF COMPLIANCE

CONTRACT NUMBER_____

PROJECT NUMBER_____

CONTRACTOR'S NAME_____

MANUFACTURER'S NAME_____

660

B/L or INVOICE NUMBER_____

MATERIAL DESTINATION_____

This is to certify that for the contract described above, the materials supplied are as follows:

**MATERIAL NAME

QUANTITY

670

_____	_____
_____	_____
_____	_____

***Conform to:_____

680 The materials listed above comply with the following Test Methods and are within the acceptable limits of said Test Methods:

TEST METHOD	LIMITS OF TEST VALUE	ACTUAL TEST RESULTS
_____	_____	_____
_____	_____	_____
_____	_____	_____

690

_____	_____
Date	Company of Manufacture

* Signature of Company Official/Title	

STATE OF _____)

COUNTY OF _____)

700

Personally before me, a Notary Public in and for the above said State and County, did appear _____
on the date of _____, 19_____ and sign the above Certificate.

Notary Public

My Commission expires_____

710

* This Certification shall be prepared by the manufacturer of the material being supplied for this contract.

** Identifying information such as Alloy, Grade, Type, Class, or other similar designation shall also be shown when appropriate.

*** Applicable material specification reference shall be listed.

(k) Sample Type B Certification Form.

720

INDIANA DEPARTMENT OF TRANSPORTATION

TYPE B CERTIFICATE OF COMPLIANCE

CONTRACT NUMBER_____

PROJECT NUMBER_____

CONTRACTOR'S NAME_____

730 MANUFACTURER'S NAME_____

B/L or INVOICE NUMBER_____

MATERIAL DESTINATION_____

This is to certify that for the contract described above, the materials supplied are as follows:

**MATERIAL NAME

QUANTITY

740 _____

***Conform to:_____

750

The materials listed above comply with the following Test Methods and are within the acceptable limits of said Test Methods:

TEST METHOD

LIMITS OF TEST VALUE

760 _____

Date

Company of Manufacture

Signature of Company Official/Title

STATE OF _____)

COUNTY OF _____)

770

Personally before me, a Notary Public in and for the above said State and County, did appear _____ on the date of _____, 19_____ and sign the above Certificate.

Notary Public

My Commission expires_____

* This Certification shall be prepared by the manufacturer of the material being supplied for this contract.

** Identifying information such as Alloy, Grade, Type, Class, or other similar designation shall also be shown when appropriate.

*** Applicable material specification reference shall be listed.

(I) Sample Type C Certification Form.

CONTRACT NUMBER_____

PROJECT NUMBER_____

CONTRACTOR'S NAME_____

MANUFACTURER'S NAME_____

B/L or INVOICE NUMBER_____

MATERIAL DESTINATION_____

This is to certify that for the contract described above, the materials supplied are as follows:

**MATERIAL NAME QUANTITY

_____	_____
_____	_____
_____	_____
_____	_____

***Conform to:_____

917.01 **QUALITY ASSURANCE AGGREGATE CERTIFICATION**

Date

Company of Manufacture

* Signature of Company Official/Title

STATE OF _____)

COUNTY OF _____)

Personally before me, a Notary Public in and for the above said State and County, did appear _____ on the date of _____, 19_____ and sign the above Certificate.

Notary Public

My Commission expires_____

* This Certification shall be prepared by the manufacturer of the material being supplied for this contract.

** Identifying information such as Alloy, Grade, Type, Class, or other similar designation shall also be shown when appropriate.

*** Applicable material specification reference shall be listed.

(m) For Ground Granulated Blast Furnace Slag

**GROUND GRANULATED BLAST FURNACE SLAG SOURCE
CERTIFICATION**

This is to certify that all grade _____, ground granulated blast
(100 or 120)
furnace slag (GGBFS), produced by the _____ from granulated
(Manufacturer's Name)
blast furnace slag from _____
(Steel Company)
located in _____,
(City) (State)
manufactured at _____
(Location of Manufacturing Plant)
using _____
(Type of Manufacturing Facility)

and shipped for use on Indiana Department of Transportation projects will be produced under appropriate quality control. The GGBFS will comply with all ASTM C 989 Specification and Indiana Department of Transportation Standard Specifications requirements.

_____ also agrees that any part of the above named
(Manufacturer's Name)

steel company and its manufacturing plant associated with the production of such ground granulated blast furnace slag may be checked at regular intervals by properly identified representatives of the Indiana Department of Transportation.

870 As an approved source of ground granulated blast furnace slag,
_____ shall be in accordance with the Indiana
(Manufacturer's Name)
Department of Transportation Standard Specifications for all quality assurance testing and
report requirements.

(Date)

(Manufacturer's Name)

880 _____
(Signature)

State of _____) SS:

County of _____)

Subscribed and sworn to before me by _____
of the firm of _____ this ____ day of _____ 19 ____.

890 _____
Notary Public

My Commission Expires: _____

(n) Sample Asbestos Exclusion Letter. Prior to acceptance of work and final payment,
the Contractor shall submit to the Engineer for each building or bridge, on the Contractor's
letterhead, a signed, dated copy of the following:

ASBESTOS EXCLUSION LETTER

900 _____
Date

work address of Engineer for
Indiana Department of Transportation

Att.: _____
Name, Engineer

910 Re: Asbestos Exclusion
Location/Description
Contract Number
Bridge Structure Number
Contractor's Name

Dear Engineer:

I hereby certify that to the best of my knowledge no asbestos containing material was used as a building material in this project.

Very truly yours,

signature of Contractor official

title of Contractor official

SECTION 917—QUALITY ASSURANCE AGGREGATE CERTIFICATION

917.01 General Requirements. An aggregate source may be authorized to ship products in the status of a Certified Aggregate Producer who is in accordance with the required standards of the Certified Aggregate Producer Program. This will consist of a voluntary program which will require the aggregate source to make a commitment to product quality management. Approval to participate in the program will be based on the following criteria.

- (a) Existence of suitable materials in the deposit being mined.
- (b) Facilities capable of consistently processing uniform materials in accordance with the specification requirements.
- (c) A source Quality Control Plan which will ensure that the mineral aggregates have a 95 percent assurance of being in accordance with the Department's quality and uniformity requirements.

Specific details of this program are contained in the Certified Aggregate Producer Program. Sampling and testing details are found in the Inspection and Sampling Procedures for Fine and Coarse Aggregates manual. A Certified Aggregate Producer shall operate in accordance with the requirements of both publications.

Aggregates provided by a source other than a Certified Aggregate Producer shall be sampled and tested in accordance with the Department's pre-ship testing system.

917.02 Quality Control Plan. An aggregate source will not be approved as a Certified Aggregate Producer until it has prepared a Quality Control Plan and the plan has been approved. The plan shall encompass all details of production starting with the extraction of the indigenous raw materials and concluding with material shipped from the plant. The Quality Control Plan shall be prepared in accordance with the requirements of the Certified Aggregate Producer Program.

917.03 Source Approval Requirements. The Division of Materials and Tests shall be notified in writing that the aggregate source wants to become a Certified Aggregate Producer. The aggregate source shall identify the specific products for which approval is sought. Such list shall include all of the products to be produced at the source regardless of whether the products are for Department or other uses.

An aggregate source may not be considered for entry into the certification program until the preliminary source investigation has been completed in accordance with Indiana Test Method 203.

The following procedure will be used to establish an aggregate source as a Certified Aggregate Producer.

(a) Step 1. The source shall enter the coordinated testing phase of the Certified Aggregate Producer Program. Coordinated testing shall be performed in accordance with the Certified Aggregate Producer Program. During this phase, the producer shall be required to develop a Quality Control Plan to establish demonstrated mean test values and standard deviations.

(b) Step 2. The aggregate source shall enter the trial phase. While operating in this phase, the authorization to ship materials shall continue to be in accordance with the Department's pre-ship testing system. The producer shall also operate in accordance with the Certified Aggregate Producer Program and the Quality Control Plan. The Quality Control Plan shall be refined as may be necessary.

(c) Step 3. The aggregate source will become an approved Certified Aggregate Producer following satisfactory performance during the trial phase. Achieving such status shall be accompanied by the inherent responsibility to operate within the tenets of the Certified Aggregate Producer Program. The Certified Aggregate Producer shall produce material at a compliance requirement of effectively 95 percent of the appropriate specifications. The Department will monitor such compliance through the use of periodic in-depth inspections of the production site. Continuing approval is contingent upon the effectiveness of the producer's Quality Control Plan as evidenced by the quality and uniformity of the products which are prepared in accordance with the appropriate specifications and the Certified Aggregate Producer Program.

917.04 Removal from Certified Producer Status. The Division of Materials and Tests will be responsible for the review and removal of an aggregate source from being an approved Certified Aggregate Producer. A Certified Aggregate Producer shall operate so as to avoid a need for the Department to exercise this action. However, removal from Certified Producer status may be necessary for situations such as:

- 80 (a) The statistical probability of the product compliance has fallen below 90 percent.
- (b) The product has a 90 to 95 percent probability of compliance but the producer has failed to take corrective action to restore 95 percent probability.
- (c) The Certified Aggregate Producer has failed to take immediate corrective action relative to deficiencies in the performance of the approved Quality Control Plan.
- 90 (d) Evaluation of data has demonstrated an inability of the Certified Aggregate Producer to consistently be in accordance with Department requirements.
- (e) The Certified Aggregate Producer has deliberately shipped aggregate material which is not in accordance with the specifications, or has falsified records.
- (f) The production site has not been operated in accordance with the Summary of Production or Ledge Quality Results letter.
- 100 Notice of removal from Certified status will be in written form, will be issued by the Division of Materials and Tests, and will identify the reasons for the removal. Effective immediately upon receipt of such notification, no further aggregate shipments shall be made on a certified basis. Subsequent shipping of aggregate materials shall revert to the Department's pre-ship testing system.

917.05 Appeals. The producer shall have the right to appeal removal from Certified Producer status to the Engineer. The appeal shall be in written form, shall state the reason or reasons on which the appeal is based, and shall be received within 14 calendar days of receipt of the removal notice.